

What is claimed is:

1                   1.       A vehicular inflatable restraint system inflator device comprising:  
2                   a housing, the housing having a disk form and defining a first chamber,  
3                   the first chamber in a static state containing a quantity of a first gas generant material  
4                   ignitable to produce first combustion products including a first inflation gas, the  
5                   housing having at least a first and a second row of spaced apart gas exit ports adapted  
6                   to permit passage of the first inflation gas from the inflator device into an associated  
7                   inflatable airbag cushion;

8                   the first chamber containing at least one inflation gas-permeable  
9                   treatment element disposed between the quantity of the first gas generant material and  
10                  the at least two rows of spaced apart gas exit ports, wherein passage of gas through the  
11                  treatment element results in treatment thereof;

12                  the first chamber also containing a second chamber; the second chamber  
13                  in a static state having an enclosed volume containing a quantity of a second gas  
14                  generant material ignitable to produce second combustion products; the second  
15                  chamber having a lid closure adapted to permit fluid communication of the second  
16                  combustion products with the contents of the first chamber;

17                  a first initiator device operatively associated with the first chamber; and

18                  a second initiator device operatively associated with the second  
19                  chamber;

the inflator device discharging sufficient inflation gas to inflate a passenger inflatable airbag cushion.

2. The vehicular inflatable restraint system inflator device of claim 1 additionally comprising a barrier closing the gas exit ports to mass flow in a static state.

3. The vehicular inflatable restraint system inflator device of claim 1 wherein the device has a gas output of at least 2 moles of inflation gas.

4. The vehicular inflatable restraint system inflator device of claim 3 wherein the device has a gas output in a range of about 3-4.5 moles of inflation gas.

5. The vehicular inflatable restraint system inflator device of claim 1 wherein the housing has a length to diameter ratio of at least about 0.6.

6. The vehicular inflatable restraint system inflator device of claim 5 wherein the housing has a length to diameter ratio of no more than about 1.0.

7. The vehicular inflatable restraint system inflator device of claim 6 wherein the housing has a length to diameter ratio in a range of at least about 0.7 and no more than about 0.8.

1                   8.     The vehicular inflatable restraint system inflator device of claim 1  
2 wherein each of the first and second rows of spaced apart gas exit ports comprises a  
3 plurality of holes with the holes of the first row offset relative to the holes of the  
4 second row.

1                   9.     The vehicular inflatable restraint system inflator device of claim 8  
2 wherein the holes of at least the first row includes a plurality of holes of a first  
3 diameter and a plurality of holes of a second diameter and wherein the ratio of the first  
4 diameter to the second diameter is in a range of about 1.2 to about 1.6.

1                   10.    The vehicular inflatable restraint system inflator device of claim 9  
2 wherein the first row includes at least first and second adjacent holes wherein the first  
3 adjacent hole is of the first diameter and the second adjacent hole is of the second  
4 diameter.

1                   11.    The vehicular inflatable restraint system inflator device of claim 1  
2 wherein the holes of each of the first and second rows includes a plurality of holes of  
3 a first diameter and a plurality of holes of a second diameter and wherein the ratio of  
4 the first diameter to the second diameter is in a range of about 1.2 to about 1.6.

1                   12.    The vehicular inflatable restraint system inflator device of  
2   claim 11 wherein each of the first and second rows of gas exit ports includes  
3   alternating holes of the first and the second diameters.

1                   13.    The vehicular inflatable restraint system inflator device of  
2   claim 12 wherein:

3                   the device has a gas output of at least 2 moles of inflation gas;  
4                   the housing has a length to diameter ratio of at least about 0.6 and  
5                   the holes of the first row are offset relative to the holes of the second  
6   row.

1                   14.    The vehicular inflatable restraint system inflator device of claim 1  
2   wherein the at least one inflation gas-permeable treatment element is spaced apart  
3   from the at least two rows of spaced apart gas exit ports by a plenum.

1                   15.    The vehicular inflatable restraint system inflator device of claim 1  
2   wherein at least one of the first and the second gas generant materials is a pyrotechnic  
3   material.

1                   16.    The vehicular inflatable restraint system inflator device of claim 1  
2   wherein the first gas generant material and the second gas generant material is each  
3   a pyrotechnic material.

1                   17.     The vehicular inflatable restraint system inflator device of claim 1  
2 wherein the first and second gas generant materials differ in at least one aspect  
3 selected from the group consisting of: composition, shape, form and size.

1                   18.     A passenger side vehicular inflatable restraint system inflator  
2 device comprising:

3                   a housing, the housing having a disk form and defining a first chamber  
4 having a cylindrical outer wall, the first chamber in a static state containing a quantity  
5 of a first gas generant material ignitable to produce first combustion products  
6 including a first inflation gas, the housing including a plurality of rows of spaced apart  
7 gas exit ports in the cylindrical outer wall, the gas exit ports adapted to permit passage  
8 of the first inflation gas from the inflator device into an associated inflatable airbag  
9 cushion;

10                  the first chamber containing at least one inflation gas-permeable  
11 treatment element disposed between the quantity of the first gas generant material and  
12 the spaced apart gas exit ports, wherein passage of gas through the treatment element  
13 results in treatment thereof;

14                  the first chamber also containing a second chamber, the second chamber  
15 in a static state having an enclosed volume containing a quantity of a second gas  
16 generant material ignitable to produce second combustion products, the second  
17 chamber having a lid closure adapted to permit fluid communication of the second  
18 combustion products with the contents of the first chamber;

19 a first igniter assembly operatively associated with the first chamber, the  
20 first igniter assembly comprising a first initiator device and a supply of igniter material  
21 housed in a first igniter assembly housing, wherein actuation of the first initiator  
22 produces a discharge in reaction initiating communication with at least a portion of the  
23 supply of the igniter material housed within the first igniter assembly housing and  
24 wherein the first igniter assembly housing includes a plurality of openings to permit  
25 passage of igniter material reaction products therethrough and into reaction initiating  
26 communication with at least a portion of the quantity of the first gas generant material  
27 contained in the first chamber; and

28 a second initiator device operatively associated with the second  
29 chamber;

30 the inflator device discharging sufficient inflation gas to inflate a  
31 passenger inflatable airbag cushion, wherein the inflator device discharges at least 2  
32 moles of inflation gas.

1 19. The passenger side vehicular inflatable restraint system inflator  
2 device of claim 18 wherein the first igniter assembly housing is sized to correspond  
3 the supply of igniter material housed therewithin.

1                   20.    The passenger side vehicular inflatable restraint system inflator  
2 device of claim 18 wherein the first igniter assembly additionally comprises an insert  
3 element joined to the igniter assembly housing, the insert element maintaining  
4 discharge reaction initiating communication between the first initiator device and the  
5 at least a portion of the supply of the igniter material housed within the first igniter  
6 assembly housing.

1                   21.    The passenger side vehicular inflatable restraint system inflator  
2 device of claim 18 including at least first and second rows of spaced apart gas exit  
3 ports in the cylindrical outer wall, wherein spaced apart gas exit ports of the first row  
4 are offset relative to the spaced apart gas exit ports of the second row.

1                   22.    The passenger side vehicular inflatable restraint system inflator  
2 device of claim 18 having a gas output in a range of about 3-4.5 moles of inflation gas.

1                   23.    The passenger side vehicular inflatable restraint system inflator  
2 device of claim 18 wherein the housing has a length to diameter ratio of at least about  
3 0.6.

24. The passenger side vehicular inflatable restraint system inflator device of claim 23 wherein the housing has a length to diameter ratio of no more than about 1.0.

25. The passenger side vehicular inflatable restraint system inflator device of claim 24 wherein the housing has a length to diameter ratio in a range of at least about 0.7 and no more than about 0.8.

26. The passenger side vehicular inflatable restraint system inflator device of claim 18 wherein each of the first and second rows of spaced apart gas exit ports comprises a plurality of holes with the holes of the first row offset relative to the holes of the second row.

27. The passenger side vehicular inflatable restraint system inflator device of claim 26 wherein the holes of at least the first row includes a plurality of holes of a first diameter and a plurality of holes of a second diameter and wherein the ratio of the first diameter to the second diameter is in a range of about 1.2 to about 1.6.